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## Editorial Comment

**Our Great Opportunity** For years a National crusade against tuberculosis has been conducted. This crusade must go on. Authorities have long felt that in order to accomplish the ultimate, millions of our citizens should be x-rayed; so that the discovery of early cases might be accomplished and treatment instituted, and that previously undiscovered, active cases be diagnosed, isolated and placed under proper treatment.

Our great opportunity now comes with the National Defense Program. Within the next few years millions of our young men will be inducted into the Military and Naval services. It is planned and hoped that every precaution will be taken to eliminate tuberculosis from our armed forces. With this in mind, the American College of Chest Physicians appointed a Military Affairs Committee. This committee completed a survey of the chest specialists of this country. The results of the survey are now in the hands of the Surgeon General of the Navy and of the Army. This committee also submitted a suggested plan for the rapid and efficient examination of chests including x-ray.

Briefly, this suggested plan is as follows:

1. All officers and men of the Navy, Army

and Marine Corps, as well as all who may be inducted into the service, be examined by x-ray.

2. Every officer and man to be x-rayed upon discharge from the service.

3. That a brief, but essential history be taken of each officer and recruit.

4. That the x-ray film made upon induction into the service and the one made on discharge, together with the history, be made available to the United States Veterans Bureau as early as feasible.

5. That all recruits found to have tuberculosis at the preliminary examination be referred to the proper health authorities in their home communities.

6. That a physical examination be made of each officer and recruit.

7. That a sound-proof or semi-sound-proof booth be provided for such examination.

8. That the type of x-ray unit employed afford all the facilities for rapid work.

9. That the type of x-ray film be the same for all government services, thus providing for uniform records.

10. That the size of the x-ray film be such that chance for error will be reduced to a minimum.

11. That the evaluation of x-ray plates be

made by medical officers known to be proficient radiologists. It is essential that these officers recognize minimal lesions, and at the same time will not read positive findings into the x-ray picture when not present. Great harm can come both to the armed forces and individual recruit if inefficient evaluation of chest films is not guarded against.

12. That a definite technic procedure be adopted in order that uniformity of the density of plates be accomplished.

13. This committee discussed at some length the x-ray procedure in the mass survey, in which it was suggested that the first medical procedure at the reception center be the filming of the recruit and that facilities be provided in order that the developing and drying of the film be expedited so that the evaluation of the film can be made at the end of the passage of the recruit through the medical team.

Not only the welfare of the armed forces is at stake in such a survey, but the general public and U. S. Veterans Bureau should be considered in the perfection of the plan. There will, no doubt, be thousands rejected from the military service because of tuberculosis. These thousands then should be followed up by the proper public health authorities.

The enormous cost entailed since the World War for compensation and medical care and hospitalization of veterans due to tuberculosis has made it plain that a chest x-ray must be a routine part of the health examination in order to discover the unfit already in the service and to prevent the unfit from entering the service. It costs the United States Government about forty million dollars a year for tuberculosis among World War Veterans. For a fraction of one month's cost, every person in the service, and those to be inducted into the service could be x-rayed.

It is the hope of the Military Affairs Committee of the American College of Chest Physicians and of this journal that the proper authorities of the Army and the Navy, United States Public Health Service, and the United States Veterans Bureau will develop a co-ordinated plan whereby not only all departments concerned will benefit by this survey, but the welfare of the public at large will be considered from every angle.

C. M. H.

### You Can't Educate a Cow

You cannot educate a cow to avoid contact with and spreading of tuberculosis. Elimination of Bovine Tuberculosis was secured through the proper direction of huge sums of money spent in case finding, followed by proper handling of the infected.

The National Tuberculosis Association has led in the endeavor to stimulate a similar program throughout the United States in the attempt to eliminate Human Tuberculosis. One of their great handicaps in this work in the past has been the indifference of the vast majority of the Medical Profession.

The Organized Medical Profession is now trying to assist in this great and noble work. It can be of assistance in two ways: first, by advice and constructive criticism; second, by getting whole-heartedly behind the Christmas Seal Campaign in order to secure the huge amount of funds necessary to carry on the work of initiation of case finding along proper lines all over the United States.

If Organized Medicine is active in the first objective and inactive in the second, our sincerity is certainly open to question. Let us, therefore, in localities where our assistance is welcomed, have every doctor's office a Seal Sale Booth, and where that direct assistance is not yet desired, at least let every doctor's office be a place of Seal Sale Boost, with prominent display of Seal Sale posters and hearty endorsement to the Public of the Work for which the Seal Sale stands. F. W. B.

### Political Medicine

Political Medicine is so abhorrent to the intelligent Public and Professional groups, that it needs must be opposed. Opposition of words, however, will be unavailing, especially in the field of Tuberculosis Eradication. The time has come when every general practitioner or pediatrician should tuberculin test every child of pre-school age in his or her practice and when a positive reactor is found, the adult home contacts should be tuberculin tested and the positive reactors x-rayed.

Since the proven adequacy of the Tuberculin Patch Test, it is a simple matter for the doctor to apply the little adhesive plaster to a spot of skin that has been rubbed with ether, leave it on for two days, and then

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## Tuberculosis in the Childbearing Woman

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One of the most important phases of the tuberculosis problem is that encountered in pregnancy in the tuberculous woman. The truth of this statement is substantiated by four major points. The first is the high female mortality from the disease during the childbearing years. As seen in Table I, the number is almost twice that of those dying of tuberculosis in all the other groups combined.

The second point is that these women are important sources of infection, having a large circle of contact. We can postulate from accepted figures, between 190,000 and 200,000 women of childbearing age who have tuberculosis.

The third point is that the largest number of their most intimate contacts are children. Myers<sup>30</sup> states that by the age of 20, approximately 10 per cent of those with first infection type of tuberculosis acquired in infancy are ill or have died of tuberculosis.

The fourth point is the cost of these cases to the community. The estimated cost of one case is \$3000 to \$5000.<sup>38, 39</sup>

In order that we may take steps to reduce this morbidity and mortality in women of childbearing age we must inquire into the factors which make this period especially fatal. Referring again to Table I, we see that approximately 45 per cent of the 19,881 deaths occur between 20 and 30 years of age. This group is beyond that adolescent period of growth which so many writers give as the reason for the increase in incidence of the disease, so that is not a factor. However, this decade represents the period of greatest reproductive activity.

The reproductive function as a predisposing factor in the high incidence of tuberculosis will be discussed first. That pregnancy and parturition profoundly affect all the vital organs, metabolism, and the endocrine balance, is recognized. It seems reasonable to assume that this strain would be far more severe on a constitution already trying to cope

with a tuberculous infection.

A search for statistics on the incidence of tuberculosis complicating pregnancy proves disappointing. For one thing, a busy obstetrical service does not permit the detailed and relatively expensive methods necessary for good case-finding. In the main, the incidence is reported in terms of those cases giving symptoms only during pregnancy, labor, or the puerperium. There has been little follow-up in the post-natal period.

Two hundred tuberculosis specialists in England and on the Continent agree that pregnancy does not benefit the tuberculous woman. Seventy-five per cent of them also agree that latent infections are activated, quiescent lesions lit up, and active foci made more active.<sup>22</sup>

Arrested cases can be considered safe risks only if they are carefully watched during their pregnancy for signs of renewed activity of the disease. Latent cases with no symptoms and doubtful findings on x-ray have been found to be the poorest risks. This situation can be explained by the fact that the physician is not apt to become aware of the condition until too late. In the active cases it has been found that the mildly active fibroid type run relatively little risk, but those with unstable, exudative or caseous pneumonic lesions are subject to serious progression of their disease.

There is also a tendency for those showing a relationship between the onset of symptoms and their pregnancy to show more advanced type of lesions. There is a high incidence of hemoptoic onset in these cases.

The question of parity is a moot point. Some say it has no bearing on the prognosis.<sup>41</sup> Others find that their young primipara are subject to rapid advance of their disease during pregnancy and that a multipara who has had four or five pregnancies in rapid succession is liable to die in the puerperium. The European phthisiologists quoted above declared that in healed tuberculosis one pregnancy is stood by 50 per cent, a second pregnancy aggravates the tuberculosis, and a third

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TABLE I  
1936 Mortality Statistics for the U. S. Registration Area\*

Age	All Causes	MALE DEATHS			FEMALE DEATHS		
		Tuberculosis	% TB	All Causes	Tuberculosis	% TB	
All Ages	821,439	40,912	5.0	657,789	30,615	4.6	
0- 5	89,441	1,046	1.0	69,386	936	1.0	
5- 9	10,252	372	3.6	7,914	310	3.9	
10-14	9,696	441	4.5	7,237	684	9.0	
15-19	15,472	1,521	10.0	12,540	2,657	21.0	
20-24	20,081	3,022	15.0	17,377	4,512	26.0	
25-29	21,210	3,616	17.0	19,402	4,395	22.6	
30-34	23,102	3,781	16.0	19,593	3,308	17.0	
35-39	29,690	4,187	14.0	23,413	2,859	12.0	
40-44	38,088	4,445	11.6	26,591	2,150	8.0	
45-49	47,682	4,441	9.0	31,776	1,725	5.0	
50-54	57,642	3,817	6.6	37,936	1,489	4.0	
55-59	64,386	3,230	5.0	42,832	1,295	3.0	
60-64	73,495	2,520	3.0	52,387	1,224	2.0	
65-69	81,236	1,960	2.4	62,348	1,180	1.8	
70-74	78,813	1,278	1.6	65,816	815	1.2	
75-79	74,571	787	1.0	66,856	614	0.9	
80-84	50,055	287	0.5	49,800	277	0.5	
85-89	25,235	1,106	0.4	29,231	121	0.4	
Over 90	10,407	20	0.2	14,859	29	0.2	

\* Compiled from figures furnished by the National Tuberculosis Association.

pregnancy means death.

Labor is a dangerous time for the tuberculous gravida. The rate of blood flow is increased, the respiration is deepened, and the intrathoracic pressure is increased by bearing down efforts with the glottis closed. Furthermore, the blood loss attendant on even a perfectly normal delivery can ill be spared. There is little agreement on the advisability of caesarian section in these cases. Those who favor it point out that it spares the parturient the exhaustion of labor and is the ideal procedure. Those who condemn it feel that it entails more shock to the patient than a labor which is made easy by liberal sedation in the first stage and forceps with local anesthesia in the second.

It is the puerperium, however, which is the most productive of exceedingly rapid breaking down of caseous deposits with pneumonic spread throughout the lungs or miliary spread by the blood stream throughout the body. The theory<sup>9</sup> has been advanced that the proteolytic ferment which causes the normal retrogressive changes in the uterus finds its way by the blood stream to the

lungs. By its liquifactive action there the pathological tissues are broken down and there is cavitation and spread of the infection.

Probably, the most important factors in the whole problem are prompt, accurate diagnosis and the type of treatment given. Eisele and Mason<sup>17</sup> claim that from 10 to 60 per cent of cases are missed if only physical examination is used. Figures from many sources show that the usual clinic routine is very inadequate in case-finding methods.

Treatment of tuberculosis in pregnancy has run the gamut commonly seen in conditions for which we have no specific cure. The ancients considered pregnancy beneficial to the tuberculous woman and so the situation called for no special treatment. Feeling gradually changed until the pendulum had swung to the opposite extreme, and Schauta's radical dictum, "Pregnancy in a tuberculous woman calls for abortion," was the therapeutic guide. The watch-word today is, "Treat the lung and ignore the pregnancy."

Any discussion of the treatment of a disease should start with the preventive meas-

ures. The prevention of tuberculosis in pregnancy must begin before the woman is married. First of all, she should be advised not to marry until at least two years have elapsed after cure. If already married, she should avoid pregnancy for at least three years after her case has been arrested.

Once pregnancy is established, the curative phase of the treatment is begun. If the patient is eligible for the group considered safe risks, she should be followed carefully by frequent inquiry as to symptoms, repeated physical examination, and x-ray. She should have extra rest, sunshine, moderate exercise in the open air, protection against infection, and a high carbohydrate diet.<sup>30</sup>

The best therapy for active tuberculosis in pregnancy is the sanatorium. Many physicians<sup>45</sup> engaged in this work feel that the woman should be delivered at the sanatorium so that there may be no break in the routine.

Artificial pneumothorax has come to constitute an invaluable method of treatment. It can be instituted at any point with practically no danger either to the patient or to the pregnancy. Peters and Davenport<sup>32</sup> report 60 per cent good results with tuberculosis which preceded the pregnancy and 40 per cent when it appeared at the beginning of, or during, pregnancy.

There always arises the question of the advisability of abortion. James<sup>22</sup> lists the indications for abortion as follows: (1) fever, (2) wasting, (3) many bacilli in the sputum, (4) hemoptysis and advancing consolidation, (5) tuberculosis with hyperemesis, and (6) laryngeal tuberculosis in early pregnancy. As a generalization he adds that if there are increasing symptoms and findings after six weeks to three months of sanatorium care, then abort.

Those who oppose abortion point out that the progress of the disease is not arrested by removing the pregnancy and that a higher mortality results from interference than would result if the pregnancy were allowed to proceed.<sup>35</sup>

The obstetrical treatment of these cases during labor must be especially well planned. During the first stage, sedatives should be liberally used. Care must be taken, however, not to prolong labor unduly in this way. The second stage is best shortened by forceps,

using morphine, scopolamine, or a combination of the two as an anesthetic. If this does not provide the necessary anesthesia, it has been suggested that nitrous oxide and oxygen are the least harmful of the supplementary drugs. There are two additional points of major importance in labor: even more careful asepsis and greater care in the prevention of blood loss. Some specialists in the field claim that pneumothorax or pneumoperitoneum should be established prophylactically within 24 hours of delivery in all cases showing the least suspicion of activity of the tuberculous process.

After considering all that can be done for the known case of tuberculosis complicating pregnancy, certain weak links in the life-saving chain immediately become obvious. The first of these is the inefficiency of the usual prenatal examination in discovering this disease. Probably, the main reason for this situation is the cost of the necessary tests. However, routine Mantoux or patch tests should not be prohibitively expensive and, if the importance of the test were explained to the patient, it seems very likely that cooperation would be obtained. To consolidate the knowledge gained by the tests, fluoroscopy is suggested rather than x-ray, mainly because it is cheaper. X-rays and sputum tests are then indicated for those with suspicious findings on fluoroscopy.

The second weak link in the chain is that the woman may not be in a position to accept the advice of the physician for the treatment of her disease. The disease is found to be twice as prevalent among ward patients as private patients. The less affluent are more needed at home and they are found to be reluctant to accept sanatorium care even though the expenses be borne by the state in public institutions. The solution to this problem requires education of the patient and her family and the cooperation of the social service agency.

The increasing responsibilities of the child-bearing years as a factor in the high incidence of tuberculosis is considered important by the majority of writers on the subject, but it is difficult to obtain statistics. The years of highest mortality, 20 to 30, are those during which the girl assumes the work of managing a home and rearing of children

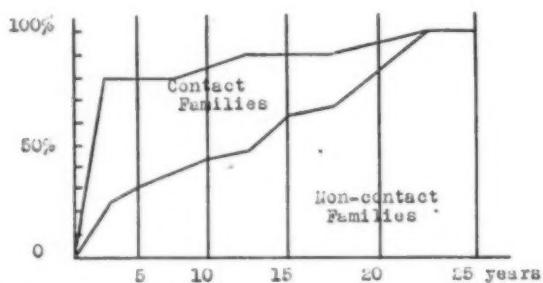
in crowded living quarters. This type of situation gives rise to all the factors which lower resistance to infection—long hours of work, insufficient rest, inadequate food and worry. Under these conditions it is very likely that an endogenous focus might be reactivated or that exogenous infection might find fertile soil.

The childbearing woman as a source of infection to children cannot be overemphasized. Congenital tuberculosis is a relatively unimportant form of infection in infants because, although highly fatal when it occurs, it is rare. Price,<sup>33</sup> in October, 1937, found only 100 cases in the literature, of which but 61 were adequately proved.

Graphs I and II indicate the importance, especially in the early years, of a contact in the family for the production of the sensitivity reaction and lesions to be found on x-ray.

GRAPH I

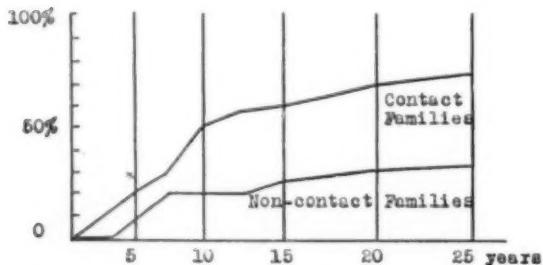
*Percentage of Positive Tuberculin Reactions*



Opie and McPhedran, Am. Rev. Tuberc., 14: 347, 1926.

GRAPH II

*Percentage of Lesions found on x-ray*



Opie and McPhedran, Am. Rev. Tuberc., 14: 347, 1926.

Eggers and Raffo<sup>16</sup> in their study of 207 cases of children of tuberculous mothers clearly show the high incidence of premature births. In their series, 73 were premature;

representing more than 35 per cent of the total.

The harm resulting from continued contact with a tuberculous mother is brought out by Brailey<sup>8</sup> who conducted a study of 223 children, 91 white and 132 colored, extending over a period of more than seven years. Her figures show that the first year in the infected is the most dangerous in both races.

Rosenberg and Keresztri<sup>34</sup> studied 348 infants infected with tuberculosis in the first five years of life, and watched them for periods ranging from one to nine years. The total death rate was 9.1 per cent. Of those with x-rays, 28.9 per cent had parenchymal lesions. Of 175 infected in the first year, the death rate was 14.8 per cent. Of 59 infected in the first half of the second year, the rate was 10.2 per cent. The highest death rate, 43.7 per cent, occurred in those infected in the first three months of life. Of those who died: 56.2 per cent died in the first year, 28.1 per cent in the second year, and 15.7 per cent in the third year.

Until vaccination with BCG or some similar preparation proves more convincingly successful, the only treatment for the child of the tuberculous mother is separation from the source of infection. The effectiveness of this procedure is brought out in several experiments conducted in France and one in Chile. Duthoit and DuBois<sup>14</sup> had absolute control over 138 children born of parents who were tuberculous at the time of the children's birth. None of the 115 children removed at birth contracted any form of tuberculosis, whereas of the 23 with a variable history of contact, four died of tuberculosis and two developed the first infection type of the disease.

Cohen<sup>11</sup> reports the fate of 719 children in 175 tuberculous families. Of 323 taken away from the mother, all remained well. Of the 396 who remained with the mother, 238, or 60 per cent, developed tuberculosis.

Flick, of Philadelphia, considered childbearing so fatal to a tuberculous woman that he said, "Many a tuberculous bride lays aside her wedding dress for a shroud."

There are two important angles of approach in the solution of this problem. The first should be the education of the profession in the importance of using the best possible

case-finding methods. We cannot afford to rely on a history of contact for a lead. The material for the Mantoux test is hard to handle for the single patients of the private practice, but the patch test material is put up in plasters which are ready for application.

The profession must realize the superlative importance of early diagnosis. A delay in diagnosis during pregnancy may mean death to a young woman or, at best, a more protracted period of illness at a time when she is most needed at home.

However promptly the doctor makes the diagnosis, his hands are tied if his patient has not been educated to the dangers of her position. Women must be taught that tuberculosis in the childbearing years is an emergency. To ask a mother to give up her newborn child or to leave her little ones to the care of others is heroic treatment. But it seems likely that she might be consoled in some measure if she knew that they were being spared by her sacrifice.

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## Traumatic Chylothorax\*

### Case Report and a New Suggestion for Treatment

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The thoracic duct has no function other than to transmit chyle from the abdomen to the vessels in the neck, and a disturbance in this function is manifested clinically by the accumulation of chyle in the pleural or abdominal cavities, or sometimes in both. Such disturbances in function may be brought about either by injury to the duct or obstruction of it, the latter being due either to pressure from without, or invasion of the wall by a malignant growth.

Since the duct is very deeply situated, and intimately associated with vital structures throughout its entire length, wounds involving the duct are usually rapidly fatal. It is not surprising, therefore, that in the world literature only about fifty case histories of traumatic chylothorax are on record. In many of these, automobile accidents were the cause of injury; in some cases, knife stabs; and in eight cases, the injury was due to bullet wounds. Owing to the extreme rarity of chylothorax from any cause, most of the cases have not been recognized early, many of them have been diagnosed as empyema and tube drainage instituted. This has probably contributed to the very high mortality which in this entire group is over fifty per cent.

The symptoms are usually slight for a period of three to seven days following the injury, then the patient goes into collapse,

characterized by dyspnea and a fall in blood pressure so that no radial pulse can be felt. Removal of the fluid results in a most dramatic relief of all the symptoms and within a few minutes the patient is apparently well again. As the fluid reaccumulates this chain of symptoms may be repeated again and again. Death may occur during this period from shock, but usually occurs much later from cachexia and exhaustion probably incident to the loss of chyle from the body.

A study of the literature on this condition soon convinces one that the various types of treatment recommended have never been satisfactory, or on a very rational basis. In most of the cases the fluid has been tapped at intervals to relieve the pressure. In some cases, a low fat diet has been used and some have advised restriction of liquid intake, but neither of these measures seems to have influenced the condition. In two cases, the aspirated chyle has been reinjected into the patient's vein, in one of these the patient died, and in the other the outcome was satisfactory.

Chylothorax due to a bullet wound must be considered as of extreme rarity since only eight cases can be found reported in the literature. The last case was reported in 1936 by Abraham Strauss<sup>5</sup> who reviewed the other seven cases in considerable detail. The mortality in these cases was twenty-five per cent. We are reporting one such case, both because of the extreme rarity of the condition and because a type of treatment was used in this case which has not hitherto been used

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or suggested in the treatment of traumatic chylothorax.

*Case Report:*

A white male, 21 years of age, was shot in the chest with a .32 caliber pistol on November 11, 1939 at 1:30 a. m. He was first seen by a physician at 4:30 a. m. the same morning. When admitted to the hospital at 5:40 a. m. he was in a state of profound shock and bathed in a cold perspiration, temperature 96°, pulse 120 and scarcely perceptible, respirations 32, groaning and labored in character. The wound of entrance was situated just below and medial to the right nipple and the bullet was lodged posteriorly in the left mid-scapular line at the level of the 6th interspace where it could be felt just beneath the skin. The lung fields were resonant throughout, x-rays of the chest showed normal lung fields, and the bullet was visualized in the location described. The abdomen was soft. 1000 c.c. of glucose in saline were administered intravenously. His general condition improved somewhat during the day.

On the following day, the patient began to have increasing respiratory difficulty and the respirations rose to 40-45 per minute, although the pulse remained firm and strong. The temperature was running around 99°<sup>2</sup>. Percussion showed a developing dullness on the left side of the chest and at 12:30 p. m. an 18 gauge needle was inserted into the left hemithorax and 300 c.c. of pure blood were removed. This seemed to afford some respiratory relief and at the same time the bullet was removed from beneath the skin with novocaine anesthesia. At 6:30 p. m. he was transfused with 500 c.c. of citrated blood.

On November 13th he looked very ill and was extremely restless, requiring morphia. The temperature was running around 101°, pulse 140, respirations 48. The left hemithorax was aspirated and 1750 c.c. of bloody fluid obtained. Within three hours, the respirations had fallen from 48 to 29 per minute.

On November 14th at 1:00 a. m. he became very dyspneic and cyanotic and the abdomen was considerably distended, respirations were labored, shallow and very noisy. The pulse was fair only, and the patient was very restless and quite irrational. 500 c.c. of bloody fluid were removed from the left chest, which

seemed to be the total amount present. However, this procedure gave very little relief. A nasal tube was passed into the stomach and about 300 c.c. of dark colored fluid were removed. He was placed in an oxygen tent, coramine and prostigmine were given and large doses of morphine. A return flow enema was started for flatus in the intestines, and glucose was administered intravenously.

On November 15th, the patient seemed improved until 10:00 a. m. when he again passed into shock with a very weak, rapid pulse. X-rays of the chest made at this time showed a massive collapse of the right lung with pneumothorax—no fluid was seen in the left side of the chest. The patient was considerably improved by that evening.

On November 17th, 600 c.c. of blood were given the patient and he seemed considerably improved.

On November 19th, he was seen by Dr. Robert E. Joseph of Salem, Oregon. At his suggestion, 750 c.c. of air were removed from the right chest which resulted in marked improvement in his respiration.

On November 20th, another 350 c.c. of air were removed from the right chest along with some very dark blood. This again resulted in great respiratory improvement.

On November 23rd, x-rays showed a large accumulation of fluid in the right chest and 1650 c.c. of this were removed. This fluid seemed partly serous and partly bloody and did not represent the entire amount present. No air was instilled into the chest.

From then on the right side was tapped frequently, and by December 24th a total of 18,290 c.c. of fluid had been removed. Examination of this fluid showed it to be chyle. The fluid at first was bloody and serous; it gradually became clear, and at the last was milky in appearance. It was always sterile on culture.

A summary of the aspirations from the right side of the chest up to this time is as follows:

*November:*

- 23rd—1650 c.c. of bloody fluid.
- 24th—890 c.c. of dark brown fluid.
- 25th—1800 c.c. of dark brown fluid.
- 26th—900 c.c. of chocolate colored fluid.
- 27th—650 c.c. of chocolate colored fluid.
- 29th—780 c.c. of dark colored fluid.

*December:*

- 2nd— 850 c.c. of creamy fluid.
- 5th— 850 c.c. of creamy fluid.
- 9th— 1600 c.c. of creamy fluid.
- 12th— 1320 c.c. of creamy colored fluid.
- 16th— 1620 c.c. of creamy colored fluid.
- 20th— 1750 c.c. of creamy colored fluid.
- 24th— 930 c.c. of creamy colored fluid.

On December 26th he was transferred to our service in Portland. Over six feet tall and weighing 128 lbs., he presented a picture of great emaciation. The skin was flabby and dry and the normal muscle tone completely gone, but there was no embarrassment of his respirations and little distress of any kind. Temperature ranged to 99° and pulse to 100. Radiographs showed a pneumothorax on the right side with a 50 per cent collapse of the lung and a fluid level to the 1st interspace anteriorly.

From favorable past experience in the closure of small bronchopleural fistulae with gomenol and mineral oil, it was decided to try this same method of treatment in this case. Injections were begun with 1 per cent gomenol in oil, starting with 1 c.c. and increasing it to 10 c.c. The schedule of aspirations and oil injections from this date on is as follows:

*December:*

- 29th—1 c.c. 1% gomenol.

*January:*

- 1st—3 c.c. 1% gomenol.
- 5th—5 c.c. 1% gomenol.
- 8th—5 c.c. 1% gomenol.
- 10th—6 c.c. 1% gomenol.
- 12th—aspiration 100 c.c. chyloid fluid.  
5 c.c. 1% gomenol.
- 15th—aspiration 1500 c.c. chyloid fluid.
- 19th—10 c.c. 1% gomenol.
- 23rd—aspiration 2200 c.c.  
10 c.c. 1% gomenol.
- 31st—10 c.c. 1% gomenol.

*February:*

- 15th—aspiration 300 c.c.
- 26th—aspiration 50 c.c. serous exudate  
—clear.
- aspiration 225 c.c. air—final intra-  
pleural pressures —5 —6.

By the middle of March, the lung was fully re-expanded, and he weighed 152 lbs. By April 15th, he weighed 160 lbs. and was discharged perfectly well.

The recorded cases of traumatic chylothorax tend to assume a definite pattern. Following the initial symptoms, which may be slight or severe, the patient's condition is generally considered satisfactory for a period of three days or more. Chyle then begins to accumulate fairly rapidly in the affected hemithorax, and if its presence is detected early and it is removed from time to time no alarming symptoms may occur. Usually, however, its development is insidious and unnoticed until symptoms of shock suddenly appear, and the search for the cause reveals a large amount of fluid in the chest.

This characteristic period of latency has led to the assumption by Strauss that the bullet probably does not actually hit the duct, but that necrosis occurs along the bullet's path and a sloughing takes place in the wall of the duct allowing the chyle to gain access to the pleural cavity.

In our case, the bullet evidently perforated the left pleura and blood accumulated in the left side of the chest soon after. The initial symptoms were very severe due to the left hemothorax and shock. Aspiration of this blood on the two days following injury caused marked relief of the respiratory distress. On the following day, however, the patient was cyanotic and his condition was very critical, but aspiration of 500 c.c. of blood, which seemed to be the total amount, did not give much relief. Presumably, the pneumothorax which was found in the right chest on the following day was already developing.

Had the bullet actually perforated the right pleura, a pneumothorax would have developed at the time rather than three days later. We feel that this fact tends to substantiate Strauss' theory and that necrosis along the bullet tract actually took place. No fluid was noticed in the right chest until November 23rd, i.e., twelve days after the accident. This also can only be explained by a late necrosis of the duct wall, rather than by actual perforation at the time.

Following the development of the chylothorax the case assumed and followed the general pattern of other similar cases reported.

On December 28th the fluid was examined. It had a specific gravity of 1.017 and an acid reaction of Ph 5.0. The microscopic examina-

tion showed no cellular material. Gram stained preparations showed no bacteria. The fat content was found to be negligible.

In view of the unusual opportunity afforded for the analysis of human chyle the Biochemistry Department of the University of Oregon Medical School made a very extensive analysis which is herewith reported for its scientific value rather than because of any clinical help which it supplied.

Substance	Percent
Water	92
Solids	8
Total fat	1.3
Total protein	4.73
(Globulin)	1.01
(Albumin)	3.72
(Fibrinogen—too low to determine)	
Sugar	35 mg.
Urea nitrogen	12.5 mg.
Non-protein nitrogen	20 mg.
Cholesterol	96 mg.
Uric acid	2.3 mg.
Phosphatase	10.2 Bodansky units
Chlorides—calculated as NaCl	400 mg. %
Inorganic phosphorus	10.6 mg.
Calcium	7.5 mg.
Sodium	258 mg.
Potassium	9.8 mg.
Magnesium	3.6 mg.
pH	7.42
Carbon dioxide combining capacity at 40 mm.	
CO <sub>2</sub> pressure	60.4 vols. %
Specific gravity	0.967 at 19° C.
Freezing point	.625°
Red blood cells	400,000
White blood cells	400
Orthotolidine test for blood	Positive

#### Comments on the composition of chyle removed from thoracic cavity

Since this material accumulated in the chest over a period of several days, its composition was undoubtedly changed somewhat by the transfer of material by diffusion into and out of the cavity.

The water and solid contents were about the same as in plasma.

The Ph and CO<sub>2</sub> combining capacity were within normal limits for plasma.

Freezing point was about the same as is normally found in plasma and indicates that the chyle was isotonic with normal blood.

The protein content was lower and the albumin-globulin ratio was higher than normally found in blood plasma.

Very little fibrinogen was present.

The sugar content was very low as compared with that of normal plasma. This may have been due to the removal of sugar from the fluid while it was stored in the thoracic cavity.

The following were lower than normally found in plasma—non-protein nitrogen, cholesterol, chloride, calcium, sodium and potassium.

The following were found in higher percentages than normally found in blood plasma—fats, inorganic phosphorus and magnesium. It is probable that the phosphate phosphorus largely rose from hydrolysis of phosphate esters while the material was in the chest cavity.

Urea and uric acid were within normal plasma limits.

#### Summary

A case is reported of chylothorax due to bullet injury. This is apparently the ninth such case reported. A new method of treatment was tried in this case, with recovery. A brief review of the salient features of chylothorax is presented and a complete chemical analysis of human chyle.

#### Conclusions

The use of gomenol and oil in the treatment of traumatic chylothorax would seem to be worthy of trial on the basis of its success in this one case. The development of chylothorax is probably due to a necrosis along the bullet path rather than to a direct injury of the thoracic duct.

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## Chronic Pulmonary Diseases from the Insurance Point of View

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If your practice consists of any considerable number of patients with chronic pulmonary disease, you will find that some cases involve insurance in one or more of its complicated forms. In the time at our disposal we must limit our discussion and, therefore, we will not consider casualty, sickness, health and accident insurance; compensation carriers or the like, nor their problems and methods. They also, at times, may disturb the peace and quiet of your practice, but to-day let us curtail our subject to Life Insurance Companies—their problems and yours.

Most large companies have been mutualized. This means that the policyholders are the owners of the company—in the last analysis are the company itself. Gains, if any, accrue to the policyholder in the form of dividends. Losses are reflected in these same dividends.

Some years ago, Life Insurance Companies incorporated into life insurance contracts a disability clause, offering to the insured the added protection of benefits in event of disabling disease. The original clauses covered total and permanent disability. Later, the total and presumably permanent or so-called temporary clause was introduced. Partial disability is usually not covered except in specific instances.

Total disability may be defined as the inability of the individual to do gainful work in his own or any other occupation.

Total and permanent disability in an insurance contract was intended to mean just what it says and a very nominal charge was

made for this additional protection. Benefits were available under this clause, if disability rendered the insured incapacitated for the remainder of his lifetime in his own or any other occupation.

With the passage of time, many companies voluntarily liberalized this definition and accepted an obviously prolonged disability as a permanent one. For example: a totally disabled tuberculous patient who has been disabled for one or two years with an eventual favorable prognosis in a year or two hence might receive favorable consideration under the above clause.

Total and presumably permanent disability is a total disability which has existed continuously for a definite period, such as ninety days, four months, or six months, permanency being assumed at the expiration of the specified period even though recovery is anticipated.

This covers briefly the more important disability clauses. The usual benefits available are as follows:

(1) *Waiver of premium* consists of a waiver of premiums during the course of approved disability; the face amount of insurance payable at death is unaffected.

(2) *Waiver of premiums plus payment of the face amount of the insurance in monthly installments at the rate of approximately one per cent* (about \$10.00 per \$1,000) per month of the face amount of insurance. In event of recovery the face amount of the original insurance is reduced by the amount of payments received by the policyholder. These

policies pay themselves out over a ten year period.

(3) *Waiver of premiums plus income payment* is the next type to be considered. The amount of original insurance is not affected in event of death in this so-called "Income Policy With Waiver of Premiums." Some income policies provided benefits in event of total and permanent disability; others, in the event of total and presumably permanent (or what is known as temporary) disability as previously defined. These policies are no longer available under the original liberal terms because companies have been so imposed upon by questionable claims with no merit or claims, never intended to be compensable in the policy coverage. Many reputable physicians have become a party to such claims in their effort to aid their patients and, as a result, the public has been deprived of one of the best forms of disability coverage.

Controversy will arise in connection with fraudulent claims. On the other hand, an honest difference of opinion may occur in borderline cases between partial and total disability.

There may be a difference of opinion as to what constitutes total disability; and, likewise, as to the interpretation of permanency. Recovery from a permanent disability is a fertile field for honest difference of expert opinion. Controversy may also arise if a claimant with a partial disability attempts to prove a state of total disability prior to age sixty; an age at which some features of disability clauses become modified.

It is when these controversies arise that the consultant and particularly the specialist in chest diseases may become exposed to numerous pitfalls, some of which I wish to mention today.

Subacute and chronic diseases constitute most of life insurance disability claims. One of the largest companies has approximately 35,000 disability claims, of these 20 to 25 per cent are due to diseases of the respiratory system, mostly pulmonary tuberculosis (8,000 to 9,000).

Smaller but difficult groups in which to evaluate disability are: asthmatics with periods of partial total disability followed by remissions; silicosis with its often meagre

symptomatology and extensive pathology; and lung tumors (not likely to give rise to a difference of opinion as to disability once the diagnosis is established).

Insurance companies may have a dual interest in pulmonary tuberculosis: (1) that of an employer, (2) that of an insurer.

These interests are not common to each other. As an employer the Company may have a tuberculosis program which consists of two separate but interrelated divisions; the one might be called the social aspect; and the other, the welfare aspect.

A phase common to both of the above divisions would be case finding, with examinations of contacts and future close observation of this group and pre-employment examinations including chest films. Such examinations not only keep down the tuberculosis incidence among the employees, but are a prophylactic procedure against unnecessary exposure of fellow associates. Pre-employment chest x-rays may be limited to Home Office employees, because facilities for such an examination are readily available whereas this procedure might not be practical in a widely diversified and scattered field group.

As elsewhere, case finding may take an active or passive form. The Company Infirmary may pick up a stray case, or examination of contacts may result in the discovery of others. A more active approach is the routine x-raying of chests in an entire department. Close observation of minor frequent illness will from time to time reveal a field case although these are usually diagnosed by attending physicians.

The Welfare Division of a company program includes the treatment and rehabilitation of employees who have been or are suffering from tuberculosis and here you have a vital interest. Some organizations grant financial assistance to their employees suffering from tuberculosis. Most companies make every effort to discourage home treatment unless the case is under the care of a competent specialist. Usually, care is provided at Company expense within certain limits at an acceptable institution. It is during the interval between institutionalization and rehabilitation that you may be requested to take the patient under your care. The problem then will be to determine when it is considered

advisable for the patient to return to his duties, assuming of course that the patient is to be re-employed. In some instances, arrangements can be made to place the patient on part time duty or light duty; in other instances, especially in agency work, it may be a full time competitive job. The productive end of a business cannot be handicapped to any great extent, and if concession to light duties is not made you may assume it is for a good reason.

The magnitude of the tuberculosis problem in such a program is comparatively small compared to the larger disability claim problem. Your relationship to the former has a patient physician status, with the Company standing by as a guardian interested in the welfare of the patient as far as it is per-

mitted to do so within the company plan.

The following tables from one of the large insurance companies will give a good cross section of the Company Tuberculosis Problem:

## CENSUS

Year	Home Office	Field	Total
1930	9,123	30,687	39,810
1931	9,237	30,513	39,750
1932	9,619	29,771	39,390
1933	10,091	29,714	39,805
1934	10,430	29,362	39,792
1935	10,403	29,208	39,611
1936	10,314	29,065	39,379
1937	10,649	28,851	39,500
1938	11,437	28,628	40,065
1939	11,452	28,195	39,647

## TUBERCULOSIS OCCURRENCE

As of Jan. 1	New Cases		New Cases		Total	Percent
	Home Office	Percent	Field	Percent		
1930	15	0.16	83	0.27	98	0.25
1931	18	0.20	74	0.74	92	0.23
1932	18	0.19	44	0.15	62	0.16
1933	20	0.20	40	0.14	60	0.15
1934	20	0.19	33	0.11	53	0.13
1935	16	0.15	33	0.11	49	0.12
1936	13	0.13	28	0.10	41	0.10
1937	15	0.14	13	0.25	28	0.07
1938	13	0.11	17	0.06	30	0.08
1939	12	0.11	18	0.06	30	0.08

## CASES TERMINATED DURING YEAR

Year	Death	Arrested	Various	Total
1930	15	36	12	63
1931	14	30	24	68
1932	10	39	17	66
1933	11	40	10	61
1934	5	54	23	82
1935	8	51	18	77
1936	6	30	10	46
1937	10	24	7	41
1938	4	18	10	32
1939	11	28*	5**	44

\* Of this number, 25 returned to active duty, 3 were not re-employed.

\*\* Of this number, 1 was retired on pension, 1 maximum allowance reached, 2 married, 1 resigned.

Insurance companies and chest specialists are constantly confronted with the major problem of chronic chest diseases in connection with disability claims. Data regarding diagnosis, treatment, and prognosis is important whether it concerns the patient as such; or, as an insurance disability problem.

The component parts of a diagnosis are: history, which includes symptoms; and examination, which may involve special examinations and many contributory tests. Diagnosis is the logical end result or conclusion reached after evaluating the history, considering the symptoms, and examining the patient. The relative importance of the component parts of a diagnosis assume a different, or, shall I say, an abnormal relationship to each other when disability is involved.

A patient usually consults or is referred to

a doctor for advice concerning an illness; and, if this be the only motive, the history will be reasonably truthful and if insurance is involved it is incidental.

Details as to the exact date of onset of illness may be the determining factor as to the validity of a claim; whereas, the approximate date of onset of illness may have seemed sufficient at the time the history was recorded.

For example, a policy provision may have lapsed at noon on May 1st. Did the sudden hemorrhage, the first indication that the patient was ill, occur on May 2nd, or do your notes simply state "early in May"? The fact that the disease must necessarily have been present prior to the above date is not in point if the insured was working (gainfully employed) up to the time of this hemorrhage. Existence of disease does not presuppose existence of disability. Here is a note taken from a recent file illustrating the point: "There have been no outward signs of disability, such as loss of weight, etc. In fact, had not the hemorrhage occurred on May 26, 1940, it is quite likely she would have continued to work for some time without consulting a physician."

The above demonstrates that the exact date of termination of employment is not necessarily identical with the date of onset of illness. The date of termination of employment may not have particularly interested the physician and the history will not be illuminating on this, the pivot on which a case may turn. Such data could in a few moments be recorded in any history; but it is the exception rather than the rule to find such specific information.

To say that a medical history is not intended as a source of information for insurance companies or courts begs the point and only leaves the impression of carelessness and remissness before a court.

These omissions or mistakes may not necessarily disappear with the burial of the patient; often much to the chagrin of even medical authorities.

Subjective disabling symptoms in the history must be judiciously weighed in relationship to objective findings. Whenever possible prove subjective symptoms objectively. If objective findings are entirely absent or negligible, and if the diagnosis is based on sub-

jective symptomatology or inconclusive evidence, then the conclusions drawn are not on a critical basis. Diagnosis should be determined whenever possible beyond any question of doubt. Future litigation may involve the question of diagnosis and testimony will be ineffective if the diagnosis be open to attack or question. Or, what is more embarrassing, it may give opportunity for the assumption of another possible diagnosis. Such eventualities may cast reflections on your competence, particularly so because you are rarely granted an occasion to justify your position. You may be obliged to rest your case on evidence that has already been presented by others.

Your diagnosis might have been made more conclusive by a simple test or two; a few additional notes; a more complete record; a concentrated sputum test; guinea pig inoculation or stomach lavage; or another x-ray which might have settled the questionable point.

The criteria for the diagnosis of pulmonary tuberculosis is well established; and of these, the symptomatology or its absence is the least important, because subjective evidence alone does not unquestionably make or eliminate the diagnosis.

A single x-ray may or may not be sufficient, but it is not infrequent for able specialists to disagree as to the interpretation of a single film. If controversy arises over a film each contestant will draw conclusions most favorable to himself.

While on the question of symptoms—dyspnea is a frequent disabling symptom presented in connection with disability claims—and often it is the only symptom offered in support of claim. The vital capacity index as suggested by Dr. George Ornstein is applicable providing the patient is cooperative. Vital capacities should probably be done by the nurse before the consultant sees the patient. The patient may be much more interested in demonstrating his physical fitness to the nurse than he will be later to the doctor whom he has assured of his inability to walk up a flight of stairs without stopping for a rest because of dyspnea. The doctor during the course of his examination can recheck the vital capacity and determine whether or not it compares favorably with the first read-

ing and this may also give him some idea whether or not the patient is cooperating.

Circulatory time tests have been of some help but they are not the final answer. An insurance company is more likely to accept the disabling symptom of dyspnea if a low vital capacity is supported by marked circulatory time disturbances. We hopefully look forward to the test which will objectively and independently of the patient tell us whether or not the patient's dyspnea is real or assumed.

The patient who consults a doctor in anticipation of insurance benefits he hopes to receive or have continued may lead you into no end of trouble. He is likely to neglect to inform you about the insurance benefits and his history may be colored slightly or considerably to suit his particular purpose. Many a pulmonary hemorrhage had its inception in the imagination and not in the lung of the patient.

A doctor may, of course, be requested to examine a case in behalf of an insurance company or an attorney representing a policy-holder. In either instance, the physician has had ample warning of the possibility of litigation and he can prepare himself accordingly. Under such circumstances the history again loses some of its usual value and the examiner must make every possible attempt to correlate the subjective findings with objective evidence. Many of these patients have had numerous examinations and may be well versed in the symptomatology of their disease. In these cases, particularly, you should guard yourself carefully.

Do not be led from the realm of facts and observations into that of speculation and wishful thinking.

Diagnostic Standards and Classification of Tuberculosis says: "The attempt to demonstrate tubercle bacilli in the sputum from patients with pulmonary disease must never be omitted." But many, including some reputable institutions, seem to think the above means an occasional simple smear obtained at irregular intervals. In event of failure to demonstrate tubercle bacilli in a simple smear, the more refined procedures: concentration techniques; demonstration by cultural methods; or by animal inoculation might yield the answer. Demonstration of tubercle bacilli in stomach washings either appears

to be a lost art or one still in the realms of research in spite of its acknowledged practical application. It cannot be argued that the cost of the above procedures are prohibitive because even when expense is not the paramount question we find the above studies are often not completed in spite of questionable diagnoses of pulmonary tuberculosis. The failure to have these more critical studies completed may arise to taunt you.

In regard to negative sputum where the more rigid standards can not be applied it is suggested that: "A specimen of sputum should be called negative only when no bacilli are found on concentration. For apparently arrested: at least one adequate specimen of sputum or gastric lavage must be negative once a month for three consecutive months. For arrested: the same for six consecutive months. For apparently cured: the requirements for arrested must be fulfilled; thereafter one specimen every three months must be negative for eighteen months. In addition, as stated previously, some specimens should be negative on culture and animal inoculation. It should be understood that in addition to these minimum requirements, any sputum specimen, unusual in amount or character should be examined." Likewise criteria for x-rays are well established. The failure to abide by accepted standards leads to confusion. If the standard criteria were universally used much uncertainty would be eliminated. As previously stated, funds or equipment may not always be available to permit a too rigid application of the rule, but more often indifference, lack of thoroughness, slipshod management, are responsible in many cases where cost is not the major item of consideration.

We are frequently expected to accept a problematic diagnosis when an exhaustive study might have established the status of the case. When negative sputums are reported we are rarely informed as to the technique used.

The more comprehensive studies above suggested may not be warranted if there is evidence of x-ray activity, but in the absence of unquestionable proof, the failure to carry out exhaustive studies which might have been done is the most common pitfall in the field

of chronic chest diseases.

Treatment is not the problem of an insurance carrier. Even in instances where helpful advice could be given, an insurance company must not go beyond its province. Not infrequently, however, a thorough study made on behalf of an insurance company in connection with a disability claim, not only establishes the diagnosis accurately; but also leads to the institution of proper treatment: that is, an endeavor is made to cooperate with the attending physician by complying with a request that he be furnished with the results of the study made by the independent specialist.

Prognosis is the big question mark in tuberculosis whether or not insurance is involved. Here opinions may honestly differ; and on prognosis may hinge the availability of benefits. Will the patient recover sufficiently to permit him to resume gainful occupation, and, if so, when? You should also consider the advisability of making reports of your examination directly to the insurance company without disclosing the contents to the patient. If the examination is made on behalf of a company, the claimant under no circumstances must be given unauthorized information.

Obviously, the early originators of the disability clause were not aware of the protean nature of tuberculosis. In some instances the questions asked by insurance companies cannot be answered. For example, in a moderately advanced case of exudative tuberculosis:—Do you expect recovery and, if so, when? In the main, today, companies take a rather liberal attitude in their action on tuberculosis claims.

Arrest and recovery are not identical as all well know. As to when a patient may resume gainful occupation is another very difficult

problem. A physician is justified in assuming a conservative attitude on the question of rehabilitation, particularly so, if the patient has sufficient insurance or other income to make him economically independent. Companies parallel this in their conservative handling of this problem. We are all aware of the incidence of recurrence, but this does not mean because an individual has tuberculosis plus a liberal disability income that he is necessarily for the remainder of his lifetime an invalid as some would attempt to make us believe. Other patients develop a fear of recurrence and will not resume work even at the urging of their own physicians. It is wrong to permit these individuals to develop a tuberculous neurosis.

Companies will usually cooperate in a rehabilitation plan by continuing benefits while the recovered patient is "trying out his wings."

The gainfully employed female who develops tuberculosis, recovers, and marries is an ever recurring problem to all of us. Her occupation on recovery is that of a housewife; the duties those of taking care of a small apartment. She can conveniently rest a few hours at mid-day, whether or not such a rest is necessary. In any event she would have no earned income and available insurance benefits simply augment the budget. Furnishing supporting physicians' statements in cases of this type certainly approaches questionable practice. The patient should have every reasonable benefit of the doubt, but the physician should remember that some other policyholder who also has some rights eventually pays those benefits. The policyholders pay these claims and the company merely acts as the distributing agent.

## Any Physician may Exhibit "When Bobby Goes to School" to the Public

Under the rules laid down by the American Academy of Pediatrics, their new educational-to-the-public film "When Bobby Goes to School" may be exhibited to the public by any licensed physician in the United States.

All that is required is that he obtain the endorsement of any officer of his country medical society. Endorsement blanks for this purpose may be obtained on application to the distributor, Mead Johnson & Company, Evansville, Indiana.

Such endorsement, however, is not required for showings by licensed physicians to medical groups for the purpose of familiarizing them with the message of the film.

"When Bobby Goes to School" is a 16-mm. sound film, free from advertising, dealing with the health appraisal of the school child, and may be borrowed without charge or obligation on application to the distributor, Mead Johnson & Company, Evansville, Indiana.

## Newer Aspects of the Pneumoperitoneum Treatment of Pulmonary Tuberculosis

ANDREW L. BANYAI, M.D., F.A.C.C.P.\*  
Wauwatosa, Wisconsin

It was demonstrated in a series of roentgenologic studies<sup>1</sup> that there is a considerable shortening of the apicobasal diameter of the lung during pneumoperitoneum treatment. Following the injection of 500-1000 cc. of air at the first treatment the maximum apicobasal relaxation of the lung was on inspiration 4.2 cm., on expiration 4.5 cm.; after the fifth treatment 5.6 cm. on inspiration and 3.6 cm. on expiration; after the tenth treatment 5.1 cm. on inspiration and 5.2 cm. on expiration; and after the twenty-third treatment 7.3 cm. on inspiration and 5.8 cm. on expiration. These figures compare favorably with the elevation of the diaphragm after phrenic nerve block. I<sup>2</sup> studied a group of patients who had a surgical paralysis of the phrenic nerve and found that the maximum reduction of the apicobasal diameter of the lung was 6.3 cm.; the relaxation was between 3 and 3.9 cm. in one-third of the cases, and more than 4 cm. in only 13.3 per cent.

Comparative measurements of the radiological chest volume before and after treatment that were reported in a previous communication<sup>3</sup> revealed that the sustained use of artificial pneumoperitoneum treatment was capable of producing a reduction of the lung volume with the exception of relatively few cases in which extensive pleural adhesions prevented the rise of the diaphragm.

Complete rest of the lung cannot be established by pneumoperitoneum. This is not, however, a shortcoming of this treatment. It was shown in another study<sup>4</sup> that immobilization of the lung cannot be accomplished by the most frequently used type (low tension) of artificial pneumothorax. When the respiratory expansion of the diseased portion of lung treated by pneumothorax was investigated the following findings were noted: (1) the motion of this area was less than that of the entire lung before treatment,

only 54.5 per cent; (2) the motion of these two areas was closely similar in 18.2 per cent; (3) the extent of the motion of the diseased area during treatment was greater than that of the entire lung before treatment in 27.3 per cent.

It was pointed out in a previous article<sup>2</sup> that the surgical paralysis of the phrenic nerve failed to secure pulmonary rest in 40 per cent of the cases. Artificial pneumoperitoneum, according to my observations, caused a decrease in the respiratory motion in 25.6 per cent, while the motion remained unchanged in 53.5 per cent, and increased in 20.8 per cent. Roentgenologic measurements show<sup>5</sup> that during effective pneumoperitoneum treatment the maximum as well as the average decrease in the roentgenologic surface area of the lung and, presumably, a therapeutically satisfactory pulmonary relaxation, was greater than that found after surgical paralysis of the diaphragm.

The technique of artificial pneumoperitoneum is not difficult. I prefer to give the first injection three fingers' breadth below and to the left of the umbilicus. The site is prepared by tincture of iodine or mercuric chloride, and the skin and subcutaneous tissue are infiltrated with one per cent novocain. Then with a 19 gauge needle, introduced perpendicularly, the layers of the anterior abdominal wall, particularly the peritoneum are anaesthetized. After the novocain has been injected, the plunger of the syringe is drawn outward in order to ascertain that the point of the needle is not lying in a blood vessel. By this preparatory injection one can estimate the thickness of the abdominal wall. By elevating a skin fold between the thumb and index finger a small skin incision is made to aid the smooth insertion of the Floyd needle. The handle-like head of this needle ensures a firm grasp and easy handling. Its obturator prevents its being obstructed by blood clots or tissue particles. If the needle is pushed only gently and it is passing through the tissues gradually, one can feel the resistance

\* From the Muirdale Sanatorium, Wauwatosa, Wisconsin and the Department of Medicine, Marquette University Medical School, Milwaukee, Wisconsin.

offered by the different layers of the abdominal wall. As a matter of routine, the needle is connected with a standard pneumothorax apparatus before it is inserted into the tissues. The danger of puncturing the intestines is remote. If the needle is slowly forced inward, the omentum and the intestines being soft, movable, and pliable are pushed in front of the needle but are not punctured.

At the first insertion of the needle the manometer registers neutral pressure (atmospheric or 0) in this part of the abdomen. Positive pressure appears usually after the injection of 300 to 400 cc. of air. If the point of the needle does not reach the abdominal cavity, but is lying in the tissues, or if one is dealing with a case of adhesive peritonitis, the manometer registers a rather high positive pressure following the injection of 50 cc. of air. At the same time the patient may indicate sudden, sharp pain at the site of the injection. Good indicators of a correctly performed injection are: (1) the disappearance of the liver dulness and the detection of a tympanitic percussion note over the right hypochondriac region after the injection of 300 to 400 cc. of air; and (2) the appearance of pain in the shoulder region. The latter is caused by the pressure of the injected air upon the diaphragm. The sensation is transmitted through the phrenic nerve to the cervical segment of the spinal cord and from there it radiates to the shoulder and neck through the nervus cutaneus colli and the three nervi supraclavicularis. To avoid apprehension it is a good policy to inform the patient of this eventuality. The right hypochondriac area can be easily percussed by "palm" percussion by the operator himself. A tympanitic percussion note over this region following the injection of more than 500 cc. of air is absent only: (1) in cases where the space between the liver and the lower surface of the diaphragm is obliterated by adhesions; (2) in cases where the air is injected into a pocket formed by adhesive peritonitis at or near the site of injection; and (3) in case of some technical error, such as leakage of tubes or valves, or the injection of air into the tissues of the abdominal wall. Additional technical details and observations were presented in previous articles.<sup>6</sup>

The most reliable criterion of a well performed artificial pneumoperitoneum is a roentgenologic examination with the patient in an upright position. Fluoroscopy or a roentgenogram reveals the presence of air in the subdiaphragmatic region. The area occupied by the injected air does not signify a corresponding upward displacement of the diaphragm, but it is partly made up by a ptosis of the liver, spleen, and the stomach.<sup>7</sup>

After from four to nine weeks' treatment the manometer registers a positive pressure when readings are taken prior to periodic injections.<sup>8</sup> The refills are given once a week, or at 10 to 14 days intervals. The amount of air used for refills varies from 800 to 1500 cc. The interval, the amount of air, and the length of treatment should be adapted to the individual case and should be determined by frequent fluoroscopic studies, by periodic examinations and roentgenograms.

When pneumoperitoneum is well established, the subdiaphragmatic route can be used for the subsequent injections. The patient is placed in the same position as for artificial pneumothorax. A sandbag is placed under the lateral aspect of the chest. After proper preparation of the field, and local anaesthesia, a 2.5 inch-long needle, 19 gauge, without an obturator, is connected with the manometer of a pneumothorax apparatus and inserted about 2 to 3 cm. above the costal margin. The needle must be passed rather deeply, otherwise, if the costophrenic reflection of the parietal pleura is too low, the point of the needle may enter the pleural space. Manometer readings may suggest that the air pocket of the pneumoperitoneum was reached. While under normal circumstances the pressure in the subdiaphragmatic area is negative (subatmospheric) and it oscillates correspondingly to the respiratory changes in the intrapleural pressure, it is positive in most cases of well established artificial pneumoperitoneum. In a well established pneumoperitoneum the manometer reading is more positive on inspiration and less positive on expiration, that is, the subdiaphragmatic pressure shows respiratory variations opposite to the intrapleural pressure. Because of the lesser thickness of the lower thoracic wall and because of its greater resistance, and also because larger amounts of air col-

lect underneath the diaphragm than in other parts of the abdomen, the refill injections are much easier and simpler by the subdiaphragmatic route than by the subumbilical route.

Artificial pneumoperitoneum can be used in combination with the surgical paralysis of the phrenic nerve. It is of advantage to perform the phrenic nerve block first and follow it by pneumoperitoneum. Following a phrenic nerve block, the elevation of the diaphragm can be substantially increased by repeated intraperitoneal injections of air. This combined procedure is of value particularly in unilateral cases, and in instances where, in a patient with extensive bilateral tuberculosis, one lung shows satisfactory improvement on pneumoperitoneum treatment while the disease in the other lung remains stationary, or is getting worse.

*Complications and hazards*—When resorting to this treatment one must keep in mind the possibility of some complications, such as injury to the deep epigastric artery or mesenteric vessels causing hemorrhage, and peritoneal shock due to sudden distention of the abdomen. Fortunately, I have not encountered any of these in my experience with this procedure either in a large number of cases treated for their intestinal tuberculosis, or in patients treated for their pulmonary tuberculosis. A complication that was noted in several of my patients with long continued treatment was the development of a small or moderate peritoneal effusion. Its appearance may be asymptomatic and detected only by periodic physical and roentgenologic examinations. In some of these patients the development of the peritoneal effusion was accompanied by abdominal pain and discomfort, malaise and elevation of temperature. With the exception of few instances, the effusion did not interfere with the continuance of the treatment. One patient who had been treated for seven months developed a hernia as the result of the passage of some of the injected air into the scrotum. The swelling, the size of a fist, caused considerable localized pain; it gradually disappeared in about two weeks. No recurrence of this complication has been observed since then (eight months), although the injections have

been continued at regular intervals as before. We have seen mediastinal emphysema as a complication of artificial pneumoperitoneum in eight patients.<sup>9</sup> Its onset is usually sudden and is associated with moderate to severe retrosternal pain, difficulty in coughing and expectorating, choking sensation, pain on swallowing, soreness in the neck, and pain in and about the larynx. In such cases, one can palpate the air in the deep tissues of the neck alongside the trachea and larynx, and the roentgenogram shows the presence of air along the mediastinal structures. One of our patients had an air embolism when a refill was attempted in a well established pneumoperitoneum. She made a complete recovery from the consequences of this accident, and is still receiving the treatment. Accidental death occurred in one of my patients in 1933. This patient had a thoracoplasty on the left side. Pneumoperitoneum treatments were given by the subdiaphragmatic route on the right ("good") side. Inadvertently, the needle caused a wide tear on the visceral pleura that led to a complete collapse of the "good" and only functioning lung; the patient died twelve hours later in spite of continuous efforts to save her life.

*Indications*—(1) when artificial pneumothorax is indicated but cannot be established because of pleural adhesions. In unilateral cases better results can be attained by pneumoperitoneum if it is preceded by a surgical paralysis of the phrenic nerve. (2) In addition to artificial pneumothorax in which the relaxation of the diseased basal portion of the lung is desirable but cannot be accomplished by pneumothorax alone. (3) When the tuberculous lesion is too extensive for bilateral pneumothorax. (4) When bilateral pneumothorax is disregarded because of the advanced age of the patient. (5) In bilateral pulmonary tuberculosis complicated by intestinal or peritoneal tuberculous lesions, or by basal bronchiectasis. (6) In addition to the surgical paralysis of the phrenic nerve when the sputum remains persistently positive and it is expected that closure of cavities and conversion of the sputum can be accomplished by an additional rise of the diaphragm.

*Contraindications*—(1) Generalized tuberculosis. (2) Amyloidosis. (3) Diseases of the

aorta and the coronary arteries. (4) Cardiac decompensation. (5) Plastic peritonitis with palpable masses.

#### Conclusions

(1) It has been demonstrated by roentgenologic studies that long continued artificial pneumoperitoneum treatment is capable of causing a relaxation of the lung and thus it creates mechanical and circulatory changes that are favorable for the healing of certain types of pulmonary tuberculosis.

(2) This treatment should not be employed to the exclusion of other appropriate mechanical or general measures, but only as a therapeutic adjunct in cases which cannot be treated effectively by other methods.

(3) It should be used according to the indications and contraindications described above.

(4) Closure of cavities, conversion of positive sputum cases into negative ones, and healing of tuberculous infiltrations were observed.

(5) Therapeutic failures were frequent with this treatment. This fact, however, should not detract from its merits, because the majority of the failures were attributable to the far-advanced stage of the disease, the poor resistance and defense of the patient,

rather than to the limitations of the procedure.

*Muirdale Sanatorium.*

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## Organization News •

### R E P O R T

#### Committee on Undergraduate Education in Medical Schools\*

E. W. HAYES, M.D., F.A.C.P.\*\*  
*Monrovia, California*

In rendering the report of your committee on Undergraduate Education in Medical Schools, I want to again call your attention to the reasons for the existence of this committee and to outline what the committee has accomplished up to the present time.

Most of you who are here today know that one of the principal objectives of this organization is to bring about an improvement in the methods by which chronic diseases of the lungs are taught in the various medical schools of this country. For the past four years this committee has been studying the means by which this subject is now being taught in our schools. It has been the hope that as a result of this study a schedule could be arranged that would be elastic enough

\* Read before the Sixth Annual Meeting of the American College of Chest Physicians at New York City, June 8, 1940.

\*\*Chairman, Committee for the Advancement of Undergraduate Teaching in Medical Schools of the American College of Chest Physicians.

so that it could be adopted by all the medical schools and at the same time would present to the students the subject of chronic diseases of the lungs efficiently. This committee at the present time is composed of the following men:

Dr. H. Frank Carman, Dallas, Texas.  
Dr. J. A. Myers, Minneapolis, Minn.  
Dr. Benjamin Goldberg, Chicago, Ill.  
Dr. Earle Standlee, Washington, D. C.  
Dr. Wm. Atmar Smith, Charleston, S. C.  
Dr. Julius L. Wilson, New Orleans, La.  
Dr. Edgar Mayer, New York City.  
Dr. John Peck, Oakdale, Iowa.

Dr. E. W. Hayes, Monrovia, Calif., Chairman.

These are men all deeply interested in this subject and at the present time, with one or two exceptions, are engaged in teaching.

In undertaking this work this organization is fully aware of what has been done during the past 30 or 35 years in our anti-tuberculosis campaign. It is also aware that in spite of this work which has been done in the past, tuberculosis still continues to be a very serious problem, evidenced by the fact that it still occupies first place as the cause of death in the age period of 15 to 45 years and, in addition, produces a vast amount of sickness and suffering.

The fact that tuberculosis continues to be such a serious problem is particularly lamentable because it is both preventable and curable. In other words, if we would employ in our defense mechanism the facts that we have about this disease at the present time, it would have no more serious aspects than other infectious diseases, such as small pox, diphtheria, typhoid, etc. We must then consider wherein our weakness lies in our fight against this disease.

As we investigate what has been done in the past, we find that it has been accomplished, first, by research participated in by relatively few medical men; second, by a campaign of prevention carried on almost entirely by lay people. The medical profession as a whole has taken very little, if any, part in this work.

Investigation also reveals that progress by the means employed in the past has reached a stand still and that the further solution of the situation depends directly upon the medical profession as a whole. In other words,

the family physician must shoulder the burden because it is he who is out in the front lines in a position to see and to diagnose the early cases, and it is also the family physician who, because he has the confidence of the patient and his family, is in a position to get the patient to not only do what he should to get well, but also to avoid infecting others.

The education of the public so that they will cooperate with the medical profession is an essential in the control of tuberculosis. Here, again, it is the family physician, because of his intimate contact with the family who is in a position to do this educating, but because he himself has not received a training while he was being made a physician, he is not able to carry on this education. In other words, we are failing to educate those who in turn should do the educating.

Your committee during the past four years, through questionnaires, has made a rather detailed study of the set-up for teaching chronic diseases of the lungs in the medical schools throughout the country. Besides, they have studied the recent report made by the American Medical Association as a result of its survey. It is our conclusion that there are not more than eight or ten medical schools today that offer the students an adequate training in this field.

It is not the opinion of the committee that the student should be made a specialist in this work, but rather that he should be made lung conscious and should be given a workable understanding of the diagnosis, prevention and treatment of tuberculosis.

It has been suggested that a training in this field should be secured through post-graduate study. This is true for those who specialize, but not for the medical student. Our present method of training the physician is such that if he is not taught this subject while he is a student, the chances are very strong that he will never obtain any experience or interest along this line. Only one institution out of every 24, where internships are served, now offers a service in tuberculosis, and in many of these, where such services are offered, they are such that the interne gets very little practical benefit. Again, as Dr. Casparis of Vanderbilt University

(Continued to page 348)

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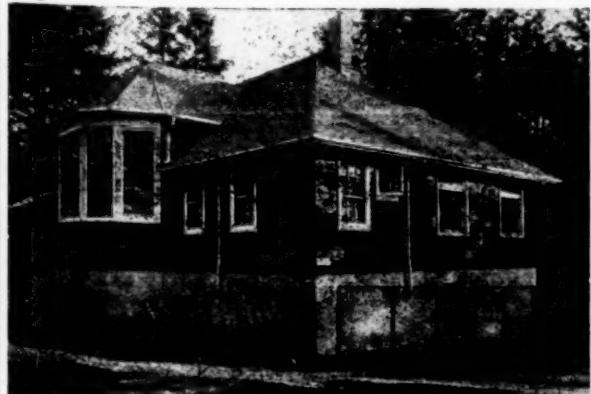
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### MODERATE RATES

Descriptive Booklet on Request

### MEDICAL DIRECTORS

Ralph C. Matson, M.D., & Marr Biscillon, M.D.  
1004 Stevens Building      Portland, Oregon

(Continued from page 346)

sity told us at the meeting of the National Tuberculosis Association in Los Angeles two years ago, "If we are going to interest the man in the general practice of medicine, we must contact him on an individual basis." He added that it is possible to contact him on an individual basis only when he is a medical student. He stated that unless we interest the general man when he is a student, we cannot attract his attention or arouse his interest by barrage after barrage of literature because he will not read the literature on tuberculosis for the same reason he will not attend clinics or lectures on this subject.

The annual meeting of the California State Tuberculosis Association was held in Santa Barbara less than two months ago. On the evening previous to the opening of the State Convention a meeting was arranged for all the physicians in Santa Barbara County and in the three adjoining counties. Dr. Chesley Bush, who is well-known throughout California as an able speaker, was engaged to address the meeting on the subject of tuberculosis. This meeting was widely publicized throughout these four counties. When the meeting was held, the President of the Santa Barbara County Medical Association, the presiding officer, was the only one of those for whom the meeting was arranged who attended. This, in spite of the fact that there are few states that have done more than California, especially during the last ten years, to interest the general medical profession in tuberculosis. Interest in this subject must be created while the physician is in the making.

To digress for a moment, I might add that it is also the purpose of this organization to maintain that interest after he goes out to practice by furnishing the family physician with information on tuberculosis that has a practical application to his daily work. An attempt is made to do this through our magazine, *Diseases of the Chest*, and also by

our Pennsylvania Plan which provides for special committees in the State, County, and component Societies which endeavor to bring into the programs of these Societies discussions of the practical problems that have to do with the handling of tuberculosis.

Medical students today, for the most part, see tuberculosis only at its worst as it appears in the wards of public hospitals or under other circumstances where the environment and general care of the patients are such as to present an extremely uninteresting picture and they leave school not only disinterested in the subject, but with a desire to avoid it as far as possible.

We have in Los Angeles a County Hospital recently constructed at the approximate cost of twenty million dollars with 35 acres of floor space and 35,000 beds. Less than a month ago I saw posted prominently on the bulletin board of the admitting room of this institution a sign stating, "No tuberculosis admitted except in acute emergency," and acute emergencies were listed as follows:

1. Hemorrhage.
2. Terminal.
3. Fever of 103 plus pneumonia.
4. Spontaneous pneumothorax.

A group of us out there are put in the ridiculous and unenviable position of attempting to teach tuberculosis to the students of two medical colleges in that institution, and internes who come from practically all over the country are supposed to receive a training in tuberculosis there.

The establishment in our medical schools of a system of teaching which will create in the mind of the student an interest in tuberculosis that will be maintained after he has gone out to practice medicine will overcome the major weakness in our defense against this disease.

*Editor's Note:* "The Schedule for Teaching Chronic Diseases of the Lungs in Medical Schools," as outlined by the Committee on Undergraduate Education of the American College of Chest Physicians, was published in Vol. VI, No. 7, July, 1940; *Diseases of the Chest*.

### ANOTHER MILESTONE PASSED

With great satisfaction we announce that J. Z. Estrin, M. D., formerly of the Herman Kiefer Hospital, in Detroit, Michigan, has become affiliated with Devitt's Camp in the capacity of resident chest surgeon.

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SISTER MARY EDWARD, Superintendent

E. W. HAYES, M.D., Medical Director

## Organization News

### NEWS FROM NORWAY

In reply to a letter sent to Dr. Carl Semb of Oslo, Norway, on April 18th, 1940, the following letter was received from Dr. Semb:

"June 13, 1940.

"Mr. Frank Walton Burge, M.D.,

Philadelphia.

Dear Doctor Walton Burge:

"Thank you very much for your letter of April 18th, which I appreciated very much. It arrived a few days ago. I am in excellent health and for the present time without need of any kind.

"I hope, however, to get in further connection with you later on. Please give my best regards to all my friends in America, especially the Chest Physicians and Surgeons.

"Again my best thanks for your very careful letter.

Sincerely your friend,  
Carl Semb."

### GEORGIA NOTES

The Division of Tuberculosis of the Department of Health is taking over the pneumothorax refill program launched a year or two ago by the Georgia Tuberculosis Association. In this program, the doctor is paid a nominal fee for given refills to the indigent.

A tuberculosis survey of the student body of The Georgia School of Technology (Ga. Tech) is being inaugurated this year. The whole group of students, numbering around 3000 are being tuberculin tested and the positive reactors x-rayed.

### CHANGE OF ADDRESS

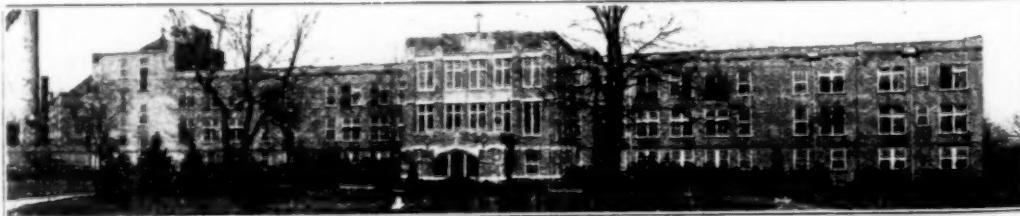
Dr. John W. Stacey, a Fellow of the College, and for the past year, Assistant Medical Director of the University of Oregon State Tuberculosis Hospital at Portland, has now opened offices at 712 Valley National Bank Building, Tucson, Arizona.

*(Continued from page 326)*

observe two days after the family has removed the Patch, whether a skin reaction has occurred or not. All painful procedure, dilutions, sterilization, etc., has been eliminated by this method of testing. Where a number of individuals in a family require a lung x-ray, the local roentgenologists can almost all be counted upon to be public spirited enough, and good business men enough, to arrange for the raying within

the means of the family concerned. In Philadelphia, where many general practitioners are cooperating in this means of case finding, the roentgenologists are giving splendid co-operation. A single film is adequate for survey work.

Mass surveys by Public Health Officials are necessary in that portion of the population that is too poor to have that greatest blessing of mankind, a Family Doctor. F. W. B.



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